

STUDIES ON SYRPHIDÆ.—I. SYRPHUS ARCUATUS FALLÉN AND A RELATED NEW SPECIES.

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(WITH PLATE I.)

Concerning the species *Syrphus arcuatus* Fallén there has always been much confusion. Not only have the color variations, which here have a wide range, given rise to a number of synonyms, but the species has been confused with other members of the genus. A number of years ago the writer began collecting material in order to study the species, and, while examining a male of what I had supposed was *arcuatus*, I was much surprised to find an area of enlarged facets on the eye as in the *Catabombas*. Examination of the rest of my collection at once revealed several more males in the same condition. When I attempted to remove these from *arcuatus* I found that some of them had a strongly curved third vein, while others had this vein straight. Here was more trouble, for Williston (Syn. N. A. Syrphidæ, pp. 68-9) had made use of this difference in venation as the basis for his two varieties *arcuatus* and *lapponicus*. The following dilemma now presented itself: if I separated the males by means of the eye characters (a supposed generic difference separating *Catabomba* from *Syrphus*) some of either lot had curved veins and I could not separate the females at all; if I separated them on the basis of the venation the females could be placed as readily as the males, but in each group some of the males had the area of enlarged facets and some lacked it. A careful examination of my material of both sexes revealed a number of minor differences correlated with the venational differences but none with the differences in the eye facets.

Not being satisfied with the study of my own material merely, I obtained the loan of specimens from many American dipterologists as well as all those in the U. S. National Museum and the American Museum of Natural History, and a number of specimens from Europe. My thanks are due for the loan of material and for other assistance to Messrs. S. W. Williston, C. W. Johnson, Jas. S. Hine,

D. W. Coquillett, N. Banks, E. L. Dickerson, R. V. Harvey and B. G. Elliott among the American entomologists, and Dr. Theodore Becker, Liegnitz, Germany, Professor Mario Bezzi, Turin, Italy, and Mr. E. E. Austen, of the British Museum.

The following redescription of *Syrphus arcuatus* is drawn from about fifty specimens, both American and European, covering a wide range in distribution, and dealing only with essential diagnostic characters.

***Syrphus arcuatus* Fallén.** (Pl. I, Figs. 1, 2, 3 and 7.)

FALLÉN, Syrphici, 42 (*Scæva arcuata*).

MEIGEN, Syst. Besch., III, 302 (*Syrphus arcuatus*).

ZETTERSTEDT, Ins. Lapp., 598 (*Scæva lapponica*).

WALKER, List, etc., III, 579-80 (*Syrphus agnon*, *alcidice* and *arcuncinctus*).

SCHINER, Verh. Zool.-Bot. Ges., VII, 344 (*Syrphus arcuatus* and *lapponicus*).

O. SACKEN, Proc. Bost. Soc. Nat. Hist., XVIII, 149; West. Dipt., 326 (*S. lapponicus*).

GIRSCHNER, Wien. ent. Zeit., III, 187 (var. *bipunctatus*).

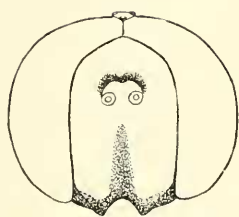
RONDANI, Att. Soc. Ital. Milano, VIII, 135 (*Syrphus lapponus*).

WILLISTON, Syn. N. A. Syrph., 68-9 (the var. *lapponicus* only).

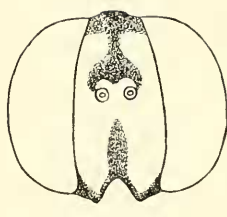
VERRALL, Br. Flies, Syrphidæ, 380 (*arcuatus* and var.? *lapponicus*); idem, Catalog, 61-2 (as two species).

OSBURN, Canad. Ent., XXXVI, 218 (the var. *lapponicus* only).

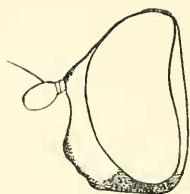
Male and Female.—Face yellow, a biarcuate black band (Pl. I, Fig. 1) transversely placed on the ridge above the antennal fossæ, not reaching downward on the fossæ except in rare cases. This band is usually narrow and is sometimes brownish, but it is never dissolved into spots. In the female (Fig. 2) it is usually broader than in the male and may or may not be connected with the black of the vertex at the middle by a narrow band. The cheeks are black and usually connected along the oral margin with the black facial stripe (Fig. 3); there is considerable variation in the oral coloration, it may be merely brownish, as the facial stripe occasionally is, and in a few cases the cheeks and facial stripe are disconnected, this seems especially true of the European specimens in my possession. The eyes of a few of the males show some enlargement of the upper facets, with a distinct line of separation as in *Catabomba*, but usually they intergrade insensibly. The few males from Europe in my collection do not have the enlarged facets separated. The pile of the sides of the thorax is usually yellowish like that of the disk, but it shows some variation in depth of color, depending apparently on age, tenerals being somewhat lighter. Legs dark at the base, exhibiting considerable variation in the extent of the marking, which may range all the way from the extreme base to one half or more of the femora. (This latter condition is the *lapponicus* Zett., in which nearly all of the North American specimens fall.) The abdominal arcuate spots also show much variation in curvature and extent:



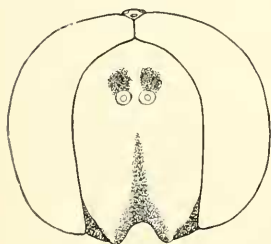
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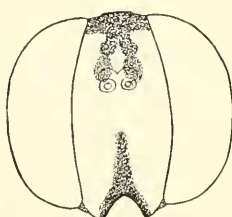
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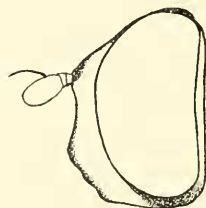
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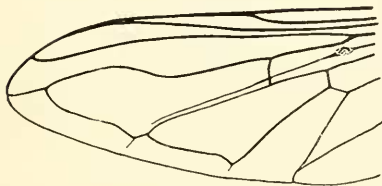
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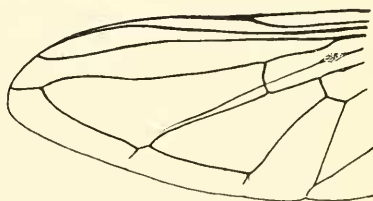
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8

Syrphidæ.

they are obsolete occasionally in the female (the *S. alcidice* of Walker and the var. *bipunctatus* of Girschner). The third vein of the wing is characteristically much curved above the first posterior cell (Fig. 7) and shows no appreciable variation in this respect. In length the species ranges from 8 mm. to 12 mm.

In North America the species ranges widely over the whole northern half of the continent. I have examined specimens from Connecticut, New Hampshire, New Jersey, District of Columbia, New Mexico, Arizona, Colorado, Idaho, Washington, British Columbia, Alberta and Ontario.

In Europe the color forms, *bipunctatus* Girsch. (= *alcidice* Walk.) and *lapponicus* Zett., are still variously listed as varieties and species, but a recent letter from Dr. Theodore Becker indicates that he regards all three as the same species, "*Syrphus lapponicus* Zett. ist keine besondere Art, vielmehr dasselbe Thier wie *arcuatus*. Diese Art variirt nicht unerheblich: es giebt weibliche Exemplare, bei denen die mondförmigen Flecke auf dem hinterleibe fast ganz verschwinden: auch die Schenkel sind an der Basis mehr oder weniger dunkel."

In America Williston confused *arcuatus* with the species here described as new, a point he makes clear in a recent letter: "I had no European specimens at the time I wrote. I would call my 'var. *lapponicus*,' *arcuatus*, of which *lapponicus* is a varietal synonym. Differences in the color of the femora, unassociated with other differences, I will not admit can be of specific value, inasmuch as such differences not infrequently appear in other species."

From my own study of the large series of specimens at my disposal I need only remark that Becker and Williston are entirely correct in these expressions of opinion and that henceforth we have only to deal with one variable species.

***Syrphus perplexus*, new species.** (Pl. I, Figs. 4, 5, 6 and 8.)

WILLISTON, Syn. N. A. Syrph., 68-9 (*Syrphus arcuatus* var. *arcuatus*).

BANKS, Journ. N. Y. Ent. Soc., V, 41 (*S. arcuatus*).

COQUILLET, Proc. Wash. Acad. Sci., II, 431 (*S. arcuatus*).

VERRALL, Br. Flies, VIII, 381 (? *S. arcucinctus*).

OSBURN, Canad. Ent., XXXVI, 218 (*S. arcuatus*).

Male and Female.—Size and general appearance about as in *arcuatus*. Face yellow with black or brown markings as follows: (1) Two rounded spots one above each antennal fossa and running down nearly or quite to the insertion of the antenna (Fig. 4), but showing no tendency toward fusion with the spot of the opposite side. In the female (Fig. 5) the spots may be extended